



Application Serial No. 10/649,577
Attorney Docket No.: 0140153

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: **Hawks, et al.**

Serial No.: **10/649,577**

Filed: **August 26, 2003**

For: **Methods Suitable for Forming a
Microelectronic Device Package**

Art Unit: 2822

Examiner: Trinh, Michael Manh

REPLY BRIEF

Mail Stop Appeal Brief - Patents
Honorable Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir/Madam:

This is a Reply Brief in response to the Examiner's Answer, which was filed on July 21,
2008.

STATUS OF CLAIMS

Claims 1-2, 5-8, 16-17, and 20-28 are pending, and claims 3-4, 9-15, and 18-19 were canceled in previous amendments. Claims 1-2, 5-8, 16-17, and 20-28 have been finally rejected in a Final Rejection dated October 5, 2007. This Reply Brief is directed to the rejection of claims 1-2, 5-8, 16-17, and 20-28.

GROUND(S) OF REJECTION TO BE REVIEWED ON APPEAL

- A. Claims 1-2, 5-6, 16, and 20-27 under 35 USC §103(a) as being unpatentable over U.S. Patent No. 6,001,671 to Joseph Fjelstad (hereinafter “Fjelstad”) taken with U.S. Patent No. 4,944,087 to Vincent R. Landi (hereinafter “Landi”) and U.S. Patent No. 5,218,759 to Juskey et al. (hereinafter “Juskey”).
- B. Claims 7-8 and 17 under 35 USC §103(a) as being unpatentable over Fjelstad, Landi, and Juskey, and further of U.S. Patent No. 6,111,199 to Wyland et al. (hereinafter “Wyland”) and U.S. Patent No. 5,972,234 to Weng et al. (hereinafter “Weng”).
- C. Claim 28 under 35 USC §103(a) as being unpatentable over Fjelstad, Landi, and Juskey, further taken with U.S. Patent No. 4,530,152 to Roche et al. (hereinafter “Roche”).

ARGUMENT

A. Rejection of claims 1-2, 5-6, 16, and 20-27 under 35 USC §103(a) as being unpatentable over Fjelstad taken with Landi and Juskey.

In the Examiner's Answer dated July 21, 2008, the Examiner states:

The combined references including *Fjelstad taken with Landi and Juskey* prima facie teach **attaching** the removable material layer comprising a soluble adhesive to a layer of conductive material, and after encapsulant, removing the removable material by ***simply dissolving the soluble adhesive in a solvent***, without damaging the removable material and the molding material. Moreover, if the wiring layer is not needed or desired, there is no need to have a permanent bond to attach the conductive layer to the removable material comprising a soluble adhesive as in the combined references including Fjelstad, Landi, and Juskey, since the sacrificial removable layer comprising the soluble adhesive must be necessarily removed by dissolving the soluble adhesive in a solvent, as taught by the references in order to expose the isolated conductive features for electrical connection. Page 13 of Examiner's Answer dated July 21, 2008 (italics and bold font reproduced from Examiner's Answer).

The above conclusion reached by the Examiner requires the combination of three references: Fjelstad, Landi, and Juskey. However, Appellant submits that the Examiner has not provided sufficient reason or motivation to cause a person of ordinary skill in the art, at the time the invention was made, to combine Fjelstad, Landi, and Juskey. As further stated by the Examiner in the Examiner's Answer:

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to attach the removable material layer 100' to the film of conductive material 101' of *Fjelstad* by employing a removable material comprising a soluble adhesive for attaching to the conductive material, as taught by *Landi and Juskey*. This is because of the desirability to surely adhere the removable material to the conductive material, and to improve the adhesion in order to laminate and attach the removable material comprising the soluble adhesive to a surface of a conductive material. This is also because of art recognized alternative and equivalent for substitution with the desirability to simplify and easily facilitate the removal of the removable material comprising the soluble adhesive from the encapsulated device by simply dissolving the adhesive in a solvent. Page 12 of the Examiner's Answer.

Appellant respectfully disagrees with the Examiner for the following reasons. As disclosed in Fjelstad, a sacrificial layer is comprised of a dielectric polymer sheet 100' having a conductive layer 101' on one surface of the sacrificial layer 100'. *See, e.g.,* page 5, lines 28-31 and Figure 2A of Fjelstad. In Fjelstad, if a wiring layer is not needed, the entire polymer sheet 100' may simply be removed by chemically dissolving the sheet, leaving the pads and the central conductive region exposed. *See, e.g.,* column 5, lines 60-65 of Fjelstad. Thus, in Fjelstad, if a wiring layer is need, portions of polymer sheet 100' can be removed by chemical etching or laser ablation (*see, e.g.,* Fjelstad, column 5, lines 46-49), or if a wiring layer is not need, polymer sheet 100' can be removed by simply chemically dissolving the sheet. As such, Fjelstad provides a simple alternative to removing polymer sheet 100' when the wiring layer is not need – just chemically dissolve it (i.e. polymer sheet 100').

Landi discloses using an appropriate adhesive (i.e. adhesive 26) to laminate flexible substrate 16 (i.e. a sacrificial substrate) to a layer of copper. *See, e.g.,* column 4, lines 20-22, column 5, lines 15-17, and Figures 1, 2, and 3 of Landi. Landi also discloses that flexible substrate 16 and adhesive 26 should be materials which withstand the heat of molding. *See, e.g.,* column 5, lines 18-19 of Landi. In Landi, after curing molding compound 22, flexible substrate 16 and adhesive 26 are preferably removed from molded object 24 by using a solvent rinse, which will dissolve or decompose adhesive 26. *See, e.g.,* column 5, lines 1-9 of Landi. Thus, Landi requires the selection of an appropriate adhesive having specific properties to attach the flexible substrate to the layer of copper. For example, the adhesive must not soften at the temperature of molding since this will allow movement of the fine metallic traces, but still it must be removable after molding without damaging the substrate polymer. *See, e.g.,* column 6, lines 21-24 of Landi.

In contrast, Fjelstad discloses a sacrificial polymer sheet that can be removed from pads, central conductive region, and mold compound by simply dissolving the sacrificial polymer sheet. Also, in Fjelstad, the sacrificial polymer sheet can be removed by dissolution in a chemical solution without requiring the utilization of a specific type of dissolvable adhesive to bond the sacrificial polymer sheet to a copper sheet, as required in Landi. Thus, Appellant submits that a person of ordinary skill in the art at the time the invention would not reasonably combine Landi with Fjelstad as suggested by the Examiner so as to achieve the claimed invention.

Juskey discloses attaching assembly 16 (comprising a semiconductor device wirebonded to a substrate) to temporary support substrate 18 by means of adhesive 19, such as a cyanoacrylate ester adhesive (i.e. super glue). *See*, e.g., column 2, lines 32-35 and lines 45-49 and Figure 1 of Juskey. In Juskey, methods of removing the temporary support substrate, such as dissolving or degrading the adhesive bond with chemical materials may be used. *See*, e.g., column 3, lines 41-44 of Juskey. However, as disclosed in Juskey, methods of removing the temporary support structure are a function of the adhesive selected for bonding the support structure to semiconductor device substrate 12. *See*, e.g., column 3, lines 24-27 of Juskey. Thus, Juskey also requires the use of an appropriate adhesive having specific properties to enable temporary support substrate 18 to be removed from semiconductor device substrate 12 by dissolution of the adhesive. Thus, for the above reasons, Appellant submits that a person of ordinary skill in the art at the time the invention would not reasonably combine Landi with Fjelstad and Juskey as suggested by the Examiner to achieve the claimed invention.

As stated above, the Examiner's reasons why it would have been obvious to one of ordinary skill at the time the invention was made to attach the removable material layer 100' to

the film of conductive material 101' of Fjelstad by employing a removable material comprising a soluble adhesive for attaching to the conductive material include the desirability to surely adhere the removable material to the conductive material and to improve the adhesion in order to laminate and attach the removable material comprising the soluble adhesive to a surface of a conductive material. However, the Examiner fails to state how the soluble adhesives disclosed in Landi or Juskey can more surely adhere the removable material to the conductive material in Fjelstad or improve the adhesion in order to laminate and attach the removable material comprising the soluble adhesive to the surface of the conductive material.

As further stated above, the Examiner argues it would have been obvious for one of ordinary skill in the art to combine Fjelstad with Landi and Juskey because of art recognized alternative and equivalent for substitution with the desirability to simplify and easily facilitate the removal of the removable material comprising the soluble adhesive from the encapsulated device by simply dissolving the adhesive in a solvent. However, as discussed above, Fjelstad already provides a simple solution to removing the sacrificial polymer sheet – simply dissolve it. In contrast, Landi discloses attaching a flexible substrate to a layer of copper by utilizing an appropriate soluble adhesive having specific properties, and Juskey discloses attaching a temporary support structure to a semiconductor device substrate by utilizing an appropriately selected soluble adhesive. Thus, Appellant submits that by requiring an additional element that must be dissolved (i.e. a soluble adhesive), Fjelstad provides a simpler solution to removing a sacrificial polymer sheet than either Landi or Juskey. Therefore, Appellant submits that a person of ordinary skill in the art, at the time the claimed invention was made, would not have found a sufficient advantage, reason, or motivation to combined Juskey and Landi with Fjelstad, as suggested by the Examiner. As such, Appellant submits that the reason, suggestion, and

motivation for the modification of Fjelstad by Juskey and Landi proposed by the Examiner is impermissible hindsight reconstruction given the benefit of the Appellant's disclosure.

For the foregoing reasons, Appellant respectfully submits that, at the time the invention defined by independent claim 1 was made, the invention would not have been obvious to a person of ordinary skill in the art by Fjelstad, Landi, and Juskey, either singly or in combination. Thus, independent claim 1 is patentably distinguishable over Fjelstad, Landi, and Juskey and, as such, claims 2, 5-6, 16, and 20-27 depending from independent claim 1 are, *a fortiori*, also patentably distinguishable over Fjelstad, Landi, and Juskey for at least the reasons presented above and also for additional limitations contained in each dependent claim.

B. Rejection of claims 7-8 and 17 under 35 USC §103(a) as being unpatentable over Fjelstad, Landi, and Juskey, and further of Wyland and Weng.

As discussed above, independent claim 1 is patentably distinguishable over Fjelstad, Landi, and Juskey. Thus, the above discussed reasons also apply to the patentability of claims 7-8 and 17 over Fjelstad, Landi, Juskey, Wyland, and Weng.

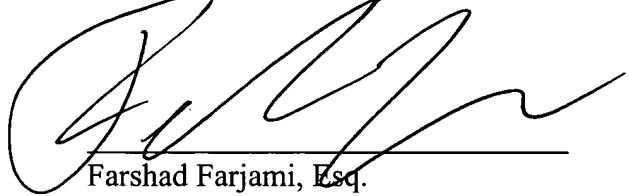
C. Rejection of claim 28 under 35 USC §103(a) as being unpatentable over Fjelstad, Landi, and Juskey, further taken with Roche.

Independent claim 28 includes similar limitations as independent claim 1. Thus, the above discussed reasons also apply to the patentability of independent claim 28 over Fjelstad, Landi, Juskey, and Roche.

CONCLUSION

For all the foregoing reasons, Appellant respectfully submits that pending claims 1-2, 5-6, 16, and 20-27 are patentably distinguishable over Fjelstad, Landi, and Juskey, either singly or in combination, pending claims 7 and 8 are patentably distinguishable over Fjelstad, Landi, Juskey, Wyland, and Weng, either singly or in combination, and claim 28 is patentably distinguishable over Fjelstad, Landi, Juskey, and Roche, either singly or in combination. Thus, an early notice of allowance directed to claims 1-2, 5-8, 16, 17, and 20-28 remaining in the present application is respectfully requested.

Respectfully Submitted,
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